

# **Borrow Pit Sampling**

**February 5, 2003**

Revised August 7, 2009

North Carolina Department of Transportation  
Materials and Tests Unit – Soils Laboratory

## SECTION 1 - PURPOSE

The purpose of this manual, in conjunction with the class presentation and other related NCDOT reference manuals (described in Section 2), is to explain the techniques for obtaining soil samples from a proposed borrow pit. A borrow pit is generally utilized by the Contractor when a project requires a larger amount of fill material versus amount of usable material obtained from cut sections. Due to the various soil types in North Carolina, a field investigation must be performed on a proposed borrow pit. This field investigation should include documented observations from the borrow pit and laboratory testing of soil samples obtained from the proposed site. Soil sampling and recorded observations completed during the field investigation of a proposed borrow pit must be performed by project personnel having a valid Borrow Pit Sampling Certification.

## SECTION 2 - IMPORTANCE OR PROPER SAMPLING

A sample is defined as a “portion, piece, or segment that is representative of a whole”. It is therefore important that the procedure(s) used to obtain this small portion not compromise the requirement that it be representative of the larger portion.

As will be discussed in the sections that follow, each borrow pit sample will be taken to a NCDOT laboratory and tested for soil classification. The soil classification is utilized to determine if the soil has the desired engineering properties (i.e. load-carrying capacity). Unsuitable soils placed in an embankment or subgrade may cause structural failure in the roadway leading to costly maintenance repairs; therefore, following proper sampling procedures can not be overemphasized. The **NCDOT Construction Manual** can provide guidance when sampling a proposed borrow pit or, during the construction phase, provide guidance when excavating soil from the pit. Project personnel should become familiar with Divisions and/or Sections listed in Table 1.

Classification	Reference Division
Materials (borrow sampling)	Division 10 (pp 10-21 thru 10-23)
Earthwork (borrow excavation)	Division 5 Section 230

Table 1

The **NCDOT Standard Specifications for Roads and Structures** can also provide guidance when sampling a proposed borrow pit or, during the construction phase, provide guidance when excavating soil from the pit. Project personnel should become familiar with sections listed in Table 2.

Classification	Reference Section
Borrow Material (sampling)	Section 1018
Borrow Excavation	Section 230

Table 2

Project personnel should also review the Project Special Provisions for any items that may influence the sampling and/or excavation of a borrow pit.

### SECTION 3 - AASHTO CLASSIFICATION SYSTEM

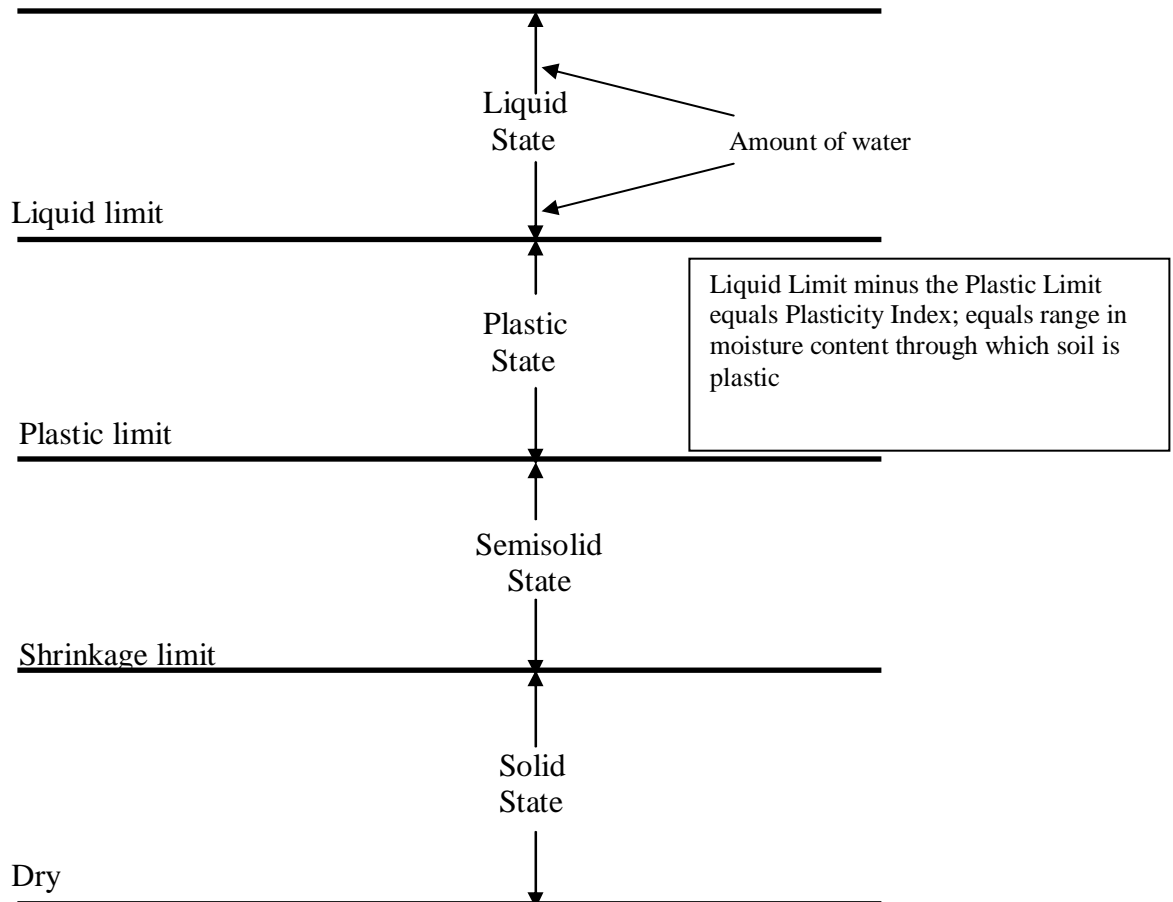
The American Association of State Highway Transportation Officials (AASHTO) has adopted a standardized method for determining soil classification or AASHTO classification. Soils are grouped by the same general load-carrying capacity from the best being A-1 to the worst being A-7. There is a wide range of load-carrying capacity within groups and an overlapping of capacity between groups. For example, an A-2 soil may contain material that makes it inferior to a specific A-5 soil. A Group Index number is used to designate the load-carrying capacity within the same AASHTO classification. For example, an A-4 (5) and A-4 (20) have the same AASHTO classification however, the group index number indicates that A-4 (5) has the greater load-carrying capacity. Several tests must be performed to determine AASHTO classification for a particular soil.

First, the overall distribution or “gradation” of particle sizes is analyzed by performing AASHTO T-88. For this AASHTO soil test, two different test methods must be utilized. The first method measures the distribution of coarse and fine sand by screening a representative sample over specific sieves to determine the percent passing each sieve. The second method measures the distribution of fine particles such as clay or silt by using a hydrometer. The hydrometer test relies on the general concept of how quickly different soil particles settle when placed in a solution of water. For example, when soil is placed in a container with water and the mixture is agitated, the sand will settle to the bottom of the container first followed by the silt and finally the clay particles.

The second step is to determine the Liquid Limit, Plastic Limit, and Plasticity Index. These tests are commonly referred as the Atterburg Limits of the soil. AASHTO T-89 is performed to determine the Liquid Limit (L.L.) of the soil. The Liquid Limit is defined as the moisture content where the soil passes from the plastic state to the liquid state. A high Liquid Limit indicates a high clay content and low load-carrying capacity. AASHTO T-90 is also performed to determine the Plastic Limit (P.L.) and the Plasticity Index (P.I.) of a soil. The Plastic Limit is defined as the moisture content at which the soil changes from a semisolid state to a plastic state. Load-carrying capacity of a soil increases rapidly below the Plastic Limit and decreases rapidly above the Plastic Limit. The Plasticity Index is defined as the numerical difference between the Liquid Limit and the Plastic Limit. Refer to the formula given below.

$$\mathbf{P.I. = L.L. - P.L.}$$

The general concept behind the Atterburg Limits tests relies on the reaction soil particles have with water. Depending on the type and amount of particles in a given soil, different states of consistency will exist based on the amount of water within the soil. For example, “beach sand” generally has extremely small amounts of clay particles and therefore would have a Plasticity Index (P.I.) of 0 or what is commonly reported as Non-Plastic (N.P.). Figure 1 graphically demonstrates these differences as water is added or removed. Refer to the glossary provided in the back of this manual for definitions of the terms in Figure 1.



**Figure 1**

Results from each AASHTO test are used to determine the soil classification. Table 3 lists the main AASHTO groups, a general rating for use in subgrade, and a general description.

AASHTO Classification	General Subgrade Rating	General Description
A-1	Excellent	Well graded coarse to fine; non-plastic or feebly plastic; includes coarse without binder
A-1-a	Excellent	Mostly stone fragments or gravel
A-1-b	Excellent	Mostly coarse sand; may need added fines for a firm base; suitable or can be made suitable for granular base coarse
A-2-4 A-2-5	Excellent	Granular with binder characteristics of A-4 and A-5 soils
A-2-6 A-2-7	Excellent to Good	Granular with binder characteristics of A-6 and A-7 soils
A-2	Good	Soils are inferior to A-1 soils due to poor grading, inferior binder, or both generally are suitable as a blanket for very plastic subgrades slated to receive concrete pavement
A-3	Good	Sands deficient in soil binder and coarse material; equigranular; examples are fine beach or desert blown sands. Water has little affect on A-3 soils
A-4	Fair	Composed mostly of silt with only moderate to small amounts of coarse material and only small amounts of clay; can vary texturally from sandy loams to silt to clay loams
A-5	Fair	Similar to A-4 except that they include very poorly graded soils containing such things as mica; is a poor stability soil.
A-6	Fair to Poor	Composed predominately of clay with moderate to negligible amounts of coarse material; have low stability at high moisture contents but are pretty stable otherwise; show shrinkage cracks during dry weather; is a good soil other than the fact that it has great affinity for water
A-7	Poor	Composed predominately of clay like A-6 but due to the presence of one-size silt particles, organic matter, mica flakes, or lime carbonate, is elastic
A-7-5	Poor	Moderate plasticity indexes; may be highly elastic. P.I. less than or equal to L.L. -30
A-7-6	Poor	High plasticity indexes P.I. greater than L.L. -30

**Table 3**

## SECTION 4 - SOIL TERMINOLOGY AND IDENTIFICATION PROPERTIES

When sampling a borrow pit, a boring log must be completed with a description of the material encountered. To aid in completing a general description for a boring log, refer to the general terms and definitions provided in Table 4.

Terms	Definition
Boulder	A rock fragment, usually rounded by weathering or abrasion, with average dimension of 12 inches or more
Cobble	A rock fragment, usually rounded by weathering or abrasion, with average dimension between 3 to 12 inches
Gravel	Rounded, sub-rounded, or angular particles of rock that will pass a 3-inch square opening sieve and be retained on a Number 4 Sieve.
Sand	Particles that will pass the Number 4 Sieve and be retained on the Number 200 Sieve
Silt	Material passing the Number 200 Sieve that is non-plastic and exhibits little or no strength when dried
Clay	Material passing the Number 200 Sieve that can be made to exhibit plasticity within a wide range of water contents and exhibits considerable dry strength
Fines	The portion of a soil sample passing a Number 200 Sieve
Marl	Unconsolidated white or dark gray calcium carbonate deposit
Muck	Finely divided organic material containing various amounts of mineral soil
Peat	Organic material in various stages of decomposition
Organic Clay	Clay containing microscopic size organic matter
Organic Silt	Silt containing microscopic size organic matter
Coarse-Grained Soil	Soil having a predominance of gravel and/or sand
Fine-Grained Soil	Soil having a predominance of silt and/or clay
Mixed-Grained Soil	Soil having significant proportions of both fine and coarse grained soil particles

**Table 4**

Table 5 provides methods for identifying items encountered while performing the field investigation.

Item	Method of Identification
Boulder	Identify by particle size
Cobble	Identify by particle size
Gravel	Identify by particle size.
Sand	Identify by particle size. Gritty grains that can easily be seen and felt. No plasticity or cohesion. Size ranges between gravel and silt.
Silt	Identify by behavior. Fines that have no plasticity. May be rolled into a thread but will easily crumble. Has no cohesion. When dry, can be easily broken by hand into powdery form.
Clay	Material passing the Number 200 Sieve that can be made to exhibit plasticity within a wide range of water contents and exhibits considerable dry strength.
Marl	A white or gray calcium carbonate paste. May contain granular spheres, shells, organic material or inorganic soils.
Muck	Black or dark brown finely divided organic material mixed with various proportions of sand, silt, and clay. May contain minor amounts of fibrous materials such as roots, leaves, and sedges.
Peat	Black or dark brown plant remains. The visible plant remains range from coarse fibers to finely divided organic material.
Organic Clay	Dark gray clay with microscopic size organic material dispersed throughout. May contain shell and/or fibers. Has weak structure which exhibits little resistance to kneading.
Organic Silt	Silt containing microscopic size organic matter.
Fill	Man-made deposits of natural soils and/or waste materials. If encountered, document components carefully.

**Table 5**

The following steps can be followed in identifying a soil encountered during the field investigation:

Step 1 - Decide if soil sample is coarse-grained, fine-grained, mix-grained or organic. If mix-grained, decide whether coarse-grained or fine-grained predominates and record conclusion

Step 2 – Determine principal or primary component. Use noun in soil description (i.e. Sand).

Step 3 – Determine secondary component. Use adjective in soil description (i.e. Silty Sand).

Step 4 – Determine if additional components exist. Use as additional adjectives (i.e. Silty Sand, Gravelly) and record conclusion

Some typical examples of soil component descriptions include: Silty Fine Sand, Gravelly Sand, Clayey Gravel, Clayey Silt, Silty Clay, etc.

Table 6 lists additional information which should be documented on the boring log.

Item	Descriptions
Color of sample	Brown, Gray, Red, Black, etc.
Moisture Condition	Dry, Moist, Wet Judge by appearance as the material is initially removed
Plasticity	Plastic, Low Plastic, Non-plastic. Sample must be in moist or wet condition for plasticity determination.

**Table 6**

The data obtained from the field investigation and the Soils Laboratory test results will serve to establish a soil profile of the borrow pit. The soil profile is the vertical cross-section composed of three major layers designated as A, B, and C-horizons.

Horizon A: basically topsoil containing organic matter except for possibly the bottom part of the layer

Horizon B: the subsoil

Horizon C: the mother soil

The usable soil can primarily be found in the B-horizon however, the lowest portion of the A-horizon and the top part of the C-horizon may also contain usable material.

## **SECTION 5 – GENERAL SAMPLING PROCEDURES**

When sampling a borrow pit, the Contractor or NCDOT may obtain the soil samples. The sampling procedures outlined below shall apply to either the Contractor or NCDOT.

1. Prior to performing any sampling, the Contractor shall furnish the Resident Engineer with a dimensioned plot plan of the proposed site to a scale such that it can be placed on 8 ½" X 11" or 11" X 17" sheet. The Contractor shall also provide a release from the property owner allowing access to the property and the right to obtain samples from the property.
2. Samples shall be obtained by the use of hand auger or power flight auger. Other equipment such as a dragline or backhoe may be used if approved by the Engineer.
3. Samples shall be obtained by the Resident Engineer or his/her representative with a valid Borrow Pit Sampling Certification
4. Each sample shall consist of **5 to 8 pounds** of soil (fill sample bag one quarter full). Place a **completed** sample card (refer to Appendix C) in each bag.
5. A minimum of two **(2) test borings per acre** will be required. The minimum number shall be increased if determined necessary in order to obtain representative samples for the entire source.



6. Each test boring shall be identified by a stake driven adjacent to the test boring hole. The test boring number shall be shown on the stake.
7. Within each boring site samples will be acquired from any significantly different layer of soil. Combining materials from different layers into a composite sample will not be permitted.
8. Each test boring shall be designated numerically (S-1, S-2, S-3, etc.) in the order of drilling.
9. The first sample from a test boring shall be identified by the test boring number. Any additional samples from a test boring shall be identified by the test boring number plus an alphabetical letter (S-1, S-1A, S-1B, etc). These additional samples shall be designated alphabetically in order from the surface down.
10. If the same soil type exists between multiple bore sites the sample can be referenced to the original soil sample. For example, if bore location number 3 from 0 – 2 feet in depth contains the same soil as encountered at bore location number 1 (0 - 2 feet) then an entry can be made on the boring log to reference soil at site #3 back to S-1 (i.e. R S-1). Therefore, no sample would be required from bore location number 3 from 0 – 2 feet in depth. Referencing soils should only be completed when the individual is confident that the material is the same (if in doubt take a sample). Refer to Appendix B for a boring log example.
11. A boring log shall be kept of each test boring and will show the following:
  - a. Test boring number
  - b. Visual description of the material encountered
  - c. Elevation or depth below surface of layer of material encountered
  - d. Location of samples obtained
  - e. Location of water table
  - f. Total depth of boring
12. For each source, a site map shall be prepared showing the following:
  - a. The location of the source in relation to natural landmarks, property lines and/or existing public roads in the area.
  - b. A plan view of the property and all test borings with identifying numbers labeled

## **SECTION 6 - SAMPLING PROCEDURES – CONTRACTOR**

If the Contractor performs sampling, the following procedures will apply in addition to the procedures listed in the previous section.

1. The Contractor shall furnish all sampling equipment.
2. A Division of Highways representative with a valid Borrow Pit Sampling Certification shall determine the frequency and location of all test borings.
3. All samples will be taken in the presence of the Resident Engineer or his/her Borrow Pit Sampling Certified representative.
4. The Resident Engineer shall be responsible for ensuring that sufficient test borings are made and samples taken are representative of the proposed source.
5. The Contractor will be responsible for marking and placing an identifying stake at each boring site.
6. The Division of Highways representative shall transport all samples to a Materials and Test Unit laboratory. The Contractor shall not deliver any samples for testing. The Division of Highways will be responsible for any soil treatment necessary because of quarantine regulations of the U. S. and/or N.C. Department of Agriculture.
7. The Division of Highways representative shall maintain the boring log and prepare the site map. Upon completion of the investigation, one (1) copy of each will be transmitted to the Materials and Tests Unit.

## **SECTION 7 – SAMPLING PROCEDURES – NCDOT**

If the Department performs sampling, the following procedures will apply in addition to the procedures listed in the general sampling section.

1. The Contractor's request for Department to perform the sampling shall be submitted to the Resident Engineer in writing.
2. The Resident Engineer will forward the request and the other required data to the Geotechnical Engineering Unit.
3. The Geotechnical Engineering Unit, prior to performing any sampling, will contact the Resident Engineer to determine if he/she desires that project personnel be present.

4. The Geotechnical Engineering Unit will obtain the samples and transport them to a Materials and Tests Unit laboratory for testing.
5. The Geotechnical Engineering Unit will be responsible for marking and placing an identifying stake at each boring site.
6. The Geotechnical Engineering Unit will be responsible for any soil treatment necessary due to quarantine regulations of the U. S. and/or N. C. Department of Agriculture.
7. The Geotechnical Engineering Unit will be responsible for submitting cost data to the Finance Department for invoicing the Contractor.

## **SECTION 8 – APPROVING BORROW SOURCE**

The Material and Tests Unit will submit copies of all test reports to the Resident Engineer for analysis. The Resident Engineer, utilizing the latest revision of the “Criteria for Acceptance of Borrow Material” (refer to appendix A), will analyze the test results, boring logs, and site map to determine the acceptability of the source. The Resident Engineer will also consider any applicable project special provisions as the basis for making the determination. The Geotechnical Engineering Unit, if requested, will assist the Resident Engineer in evaluating the material. The Resident Engineer will advise the Contractor in writing the following issues:

1. The limits of acceptable material.
2. If special handling of the material is necessary.
3. Approval of the source for borrow material is based on the limited sampling and test results of the samples submitted. Therefore, such approval is with the understanding that the Division of Highways reserves the right to use visual inspection and additional sampling on the roadway, as deemed appropriate by the Engineer, to reject any unsuitable material encountered. The rejection may occur regardless of whether or not such material was indicated as acceptable during initial borrow pit sampling.
4. Where deemed appropriate, the Resident Engineer will designate how the material is to be removed from the pit and also where to isolate areas or layers of unsuitable material in the pit.
5. Any material found on the roadway that fails to meet the acceptability requirements, shall be removed and replaced with acceptable material at no cost to the Department.

## APPENDIX A

### North Carolina Department of Transportation Division of Highways Criteria for Acceptance of Borrow Material

#### **I. Statewide Criteria:** (See exceptions in II)

Only natural earth materials may be used as borrow material. Any other materials are subject to rejection (see II-b).

Soil with P. I. of 25 or less.....Acceptable

Soil with P. I. of 26 thru 35.....Acceptable, but not to be  
used in 2 ft. of  
embankment or backfill.

Soil with P. I. of more than 35.....Not acceptable

#### **II. Exceptions to Statewide Criteria:**

- a) Soils in the Coastal Plain (area described below) shall be accepted in accordance with the following:

Soils with P. I. of 15 or less.....Acceptable

Soils with P. I. of 16 thru 20.....Acceptable, but not to be  
used in top 2 ft. of  
embankment or backfill.

Soils with P. I. of more than 20.....Not acceptable

Areas Applicable:

Division 1....Entire Division except Northampton (West of I-95)

Division 2....Entire Division

Division 3....Entire Division

Division 4....Edgecombe, Wayne, Johnston, (East of US-301),  
Wilson (East of I-95), Nash (East of I-95), Halifax  
(East of I-95)

Division 6....Bladen, Columbus, Robeson, Cumberland,  
Harnett (South of NC-27)

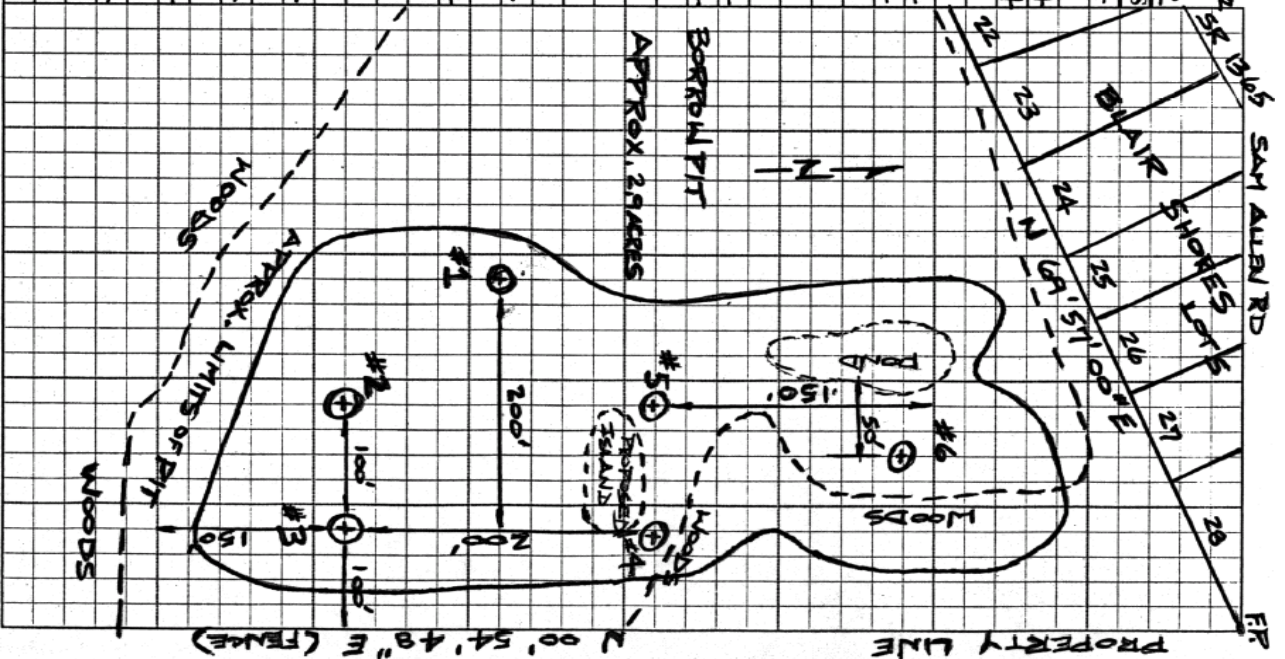
Division 8....Scotland, Hoke, Moore (Southeast of US 15-501, NC-  
73, NC-211), Richmond (East of US-220) North and  
US-1 South)

Also applicable to the floodplains of the Roanoke, Tar, Neuse, Cape Fear, and Lumber Rivers and their tributaries which are outside the above described areas.

- b) Waste or by-products from industrial processes or mining operations are not acceptable except by specific, written approval of the Engineer. This includes soil overburden from quarries.
- c) When tested, soils having a pH less than 5.5 or an organic content more than 4.0 % may be rejected.

# **APPENDIX B** **Boring Log Example and Blank Boring Log Sheets**

PROJECT: 6.142008T			TIP: N/A		DATE: 1/4/02	
COUNTY: WASHINGTON			DRILLED BY: NRB & GML		PAGE # 1 of 2	
NOTES BY: R.M. ROGERS			DESCRIPTION AND COMMENTS		MOIST CLASS	
HOLE #	DEPTH	SAMP #				
#1	0-2'	5-1	Brn-Tan Fine Sand		Moist A-2.4	
"	2-5'	5-1A	Tan-Gray Sandy Silt Water @ 3.9'		Wet A-4	
"	5-10'	5-1B	Tan-Rad Fine Sand		Sat. A-2.4	
"	10-18'	5-1C	Gray Fine Sand		Sat. A-2.4	
"	18-29'	5-1D	Tan Fine-Coarse Sand		Sat. A-3	
#2	0-3'	R(5-1)	Brn-Tan Fine Sand		M-Wet A-2.4	
"	3-7'	5-2	Tan-Gray F & Cse Sand Water @ 3.3'		Sat. A-2.4	
"	7-13'	5-2A	Tan F & Cse Sand		Sat. A-3	
"	13-23'	5-2B	Rad-Tan F & Cse Sand		Sat. A-3	
"	23-29'	5-2C	Rad-Tan - Yel Coarse Sand		Sat. A-3	
#3	0-2'	5-3	Brn-Tan Fine Sand		M-Wet A-2.4	
"	2-6'	5-3A	Tan Coarse Sand Water @ 3.8'		W-Sat A-2.4	
"	6-8'	5-3B	Rad-Gray Sandy Silt		Sat. A-4	
"	8-18'	5-3C	Tan-Rad F & Cse Sand		Sat. A-3	
"	18-23'	R(5-2)	Rad-Tan F & Cse Sand		Sat. A-3	
"	23-29'	5-3D	Rad-Tan Coarse Sand		Sat. A-3	
#4	0-1'	R(5-3)	Brn-Tan Fine Sand		Moist A-2.4	
"	1-3'	5-4	Lt. Brn. Fine Sandy Silt		Wet A-4	
"	3-10'	5-4A	Gray Fine Sand Water @ 3.1'		Sat. A-2.4	
"	10-13'	5-4B	Gray Sandy Silty Clay		Sat. A-6	
"	13-23'	5-4C	Gray Fine Sand		Sat. A-3	
"	23-29'	5-4D	Rad-Tan Coarse Sand		Sat. A-3	
#5	0-1'	R(5-3)	Brn-Tan Fine Sand		Moist A-2.4	
"	1-3'	5-5	Gray Fine Sandy Silt		Wet A-4	
"	3-5'	R(5-4)	Tan Coarse Sand Water @ 4.0'		Sat. A-2.4	
"	5-8'	5-5A	Gray Fine Sandy Silt		Sat. A-4	
"	8-10'	R(5-4A)	Gray Fine Sand		Sat. A-2.4	
"	10-13'	R(5-4B)	Gray Sandy Silty Clay		Sat. A-6	
"	13-23'	5-5B	Gray Fine Sand		Sat. A-2.4	
"	23-29'	5-5C	Gray-Tan F & Cse Sand		Sat. A-3	



**PROJECT:** 6.142008T

TIP: *N/A*

DATE: 10/01/02

NOTES BY: R. M. ROGERS

HOLE #	DEPTH	SAMP #	DESCRIPTION AND COMMENTS	MOIST	CLASS
# 6	0-4'	S-6	Brn.-Tan Fine Sand	m-vet	A-2-4
"	4-10'	S-6A	Wh.-Gray Fine Sand	Sat.	A-3
"	10-12'	R(S-4)	Gray Sandy Silty clay	Sat.	A-6
"	12-18'	S-6B	Gray Fine & coarse Sand	Sat.	A-3
"	18-23'	S-6C	Gray F.-coarse Sand	Sat.	A-3
"	23-29'	S-6D	Gray Coarse Sand	Sat.	A-3









## APPENDIX C

### Sample Card Examples

This sample card represents the soil obtained from bore hole #1 at a depth of 0 to 2 feet. For location of bore hole, refer to boring log diagram hole #1(Appendix B). Sample cards shall be legible and completed with all required information.

* Required Field		HICAMS #: <span style="border: 1px solid black; display: inline-block; width: 100px; height: 1.2em; vertical-align: middle;"></span>	
† May Be Required Based on Material			
*Material: <u>PROPOSED BORROW (SOIL)</u>		<input type="checkbox"/> Metric <input checked="" type="checkbox"/> English	
†Sample Owner: <u>PATRICK</u>	†Contract #: <u>N/A</u>		
*Testing Category: <u>QUALITY</u>	Field ID: <u>S-1</u>		
Check Sample? <u>Y</u> <u>N</u> (circle one)	Proj/PO/WO #: <u>G.142008T</u>		
†Related Sample ID: <u>N/A</u>	Line Item #: <u>N/A</u>		
†Corr. Sample ID: <u>N/A</u>	RE: <u>N.W. WAINAINA</u>		
# Of Pieces: <u>1</u>	*Rep. Qty: <u>0 to 2 ft. depth</u>		
*To Be Used In: <u>ASPHALT PLANT</u>			
Comment: <u>Proposed borrow pit for state asphalt plant off of SR 1365</u>			
*Sampled Date: <u>10/08/02</u>		*Sampled By: <u>R.M. ROGERS</u>	
*Sample From: <u>PROPOSED PIT</u>		Truck/ Container #: <u>N/A</u>	
Structure Number: <u>N/A</u>	Route Desc: _____		
Route Type: <u>I</u> <u>US</u> <u>NC</u> <u>SR</u> (circle one)	Alignment: _____		
Route Number: <u>0</u>	*Location: <u>HOLE # 1</u>	Offset Dist.: _____	
Map Number: <u>N/A</u>	*Sta. From: <u>+</u>	Sta. To: <u>+</u>	
County: <u>WASHINGTON</u>	Coastal Plain: <input checked="" type="radio"/> <u>N</u> (circle one)		
†Producer / Supplier: _____		† Plant ID #: _____	
†Brand Name: _____		Shelf Life Date: _____	
†Date Produced: _____		†Asphalt Mix / JMF ID: _____	
†Concrete Mix: _____			
† Alternate IDs Type:	Prefix:	Range:	Description of Items:
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Please use reverse side for test data, comments, and additional information... Check here if more on reverse <input type="checkbox"/>			

This sample card represents soil obtained from bore hole #1 at a depth of 2 to 5 feet. For location of bore hole, refer to boring log diagram hole #1 (Appendix B). Sample cards shall be legible and completed with all required information.

* Required Field		HiCAMS #: <span style="border: 1px solid black; display: inline-block; width: 100px; height: 1.2em; vertical-align: middle;"></span>	
† May Be Required Based on Material			
*Material: <u>PROPOSED BORROW PIT (SOIL)</u>		<input type="checkbox"/> Metric <input checked="" type="checkbox"/> English	
†Sample Owner: <u>PATRICK</u>	†Contract #: <u>N/A</u>		
*Testing Category: <u>QUALITY</u>	Field ID: <u>S-1A</u>		
Check Sample? <u>Y</u> <u>N</u> (circle one)	Proj/PO/NO #: <u>6.142008T</u>		
†Related Sample ID: <u>N/A</u>	Line Item #: <u>N/A</u>		
†Corr. Sample ID: <u>N/A</u>	RE: <u>N. W. WAINAINA</u>		
# Of Pieces: <u>1</u>	*Rep. Qty: <u>2 to 5 Ft. depth</u>		
*To Be Used In: <u>ASPHALT PLANT</u>			
Comment: <u>Proposed borrow pit for state asphalt plant off of SR 1365</u>			
*Sampled Date: <u>10/08/02</u>		*Sampled By: <u>R. M. ROGERS</u>	
*Sample From: <u>PROPOSED PIT</u>		Truck/ Container #: <u>N/A</u>	
Structure Number: <u>N/A</u>	Route Desc: _____		
Route Type: <u>I</u> <u>US</u> <u>NC</u> <u>SR</u> (circle one)	Alignment: _____		
Route Number: <u>0</u>	*Location: <u>HOLE # 1</u>	Offset Dist.: _____	
Map Number: <u>N/A</u>	*Sta. From: <u>+</u>	Sta. To: <u>+</u>	
County: <u>WASHINGTON</u>	Coastal Plain: <u>Y</u> <u>N</u> (circle one)		
†Producer / Supplier: _____		† Plant ID #: _____	
†Brand Name: _____		Shelf Life Date: _____	
†Date Produced: _____		†Asphalt Mix / JMF ID: _____	
†Concrete Mix: _____			
† Alternate IDs Type:	Prefix:	Range:	Description of Items:
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Please use reverse side for test data, comments, and additional information... Check here if more on reverse <input type="checkbox"/>			

The following example demonstrates a typical sample card from a proposed borrow pit used by a Contractor for building an embankment and/or subgrade.

<b>* Required Field</b> <b>† May Be Required Based on Material</b>		HICAMS #: <span style="border: 1px solid black; display: inline-block; width: 150px; height: 20px; vertical-align: middle;"></span>	
<b>* Material:</b> <u>SOIL</u>		<input checked="" type="checkbox"/> Metric <input type="checkbox"/> English	
<b>† Sample Owner:</b> <u>PROJECT</u>	<b>† Contract #:</b> <u>C201977</u>		
<b>* Testing Category:</b> <u>ACCEPTANCE</u>	<b>Field ID:</b> <u>S-1</u>		
<b>Check Sample?</b> Y <u>(N)</u> (circle One)	<b>Proj/Po/Wo#:</b> <u>35196.3. ST1</u>		
<b>† Related Sample ID:</b> _____	<b>Line Item #:</b> <u>12</u>		
<b>† Corr. Sample ID:</b> _____	<b>RE:</b> <u>I. M. RESIDENT</u>		
<b># of Pieces:</b> <u>1 BAG</u>	<b>* Rep. Qty:</b> <u>1</u>		
<b>* To Be Used In:</b> <u>EMBANKMENT AND/OR SUBGRADE</u>			
<b>Comment:</b> <u>BORROW PIT #1 - HOLE #1</u> <u>SAMPLE REPRESENTS 0-.5 m DEPTH</u>			
<b>* Sampled Date:</b> <u>8-3-09</u>		<b>* Sampled By:</b> <u>I. R. AUGAR</u> <span style="float: right;"><b>CERT #</b> <u>12345</u></span>	
<b>* Sample From:</b> <u>BORROW PIT</u>	<b>Truck/ Container #:</b> _____		
<b>Structure Number:</b> _____	<b>Route Desc:</b> <u>FAYETTEVILLE LOOP</u>		
<b>Route Type:</b> <u>(1)</u> US NC SR (circle one)	<b>Alignment:</b> _____		
<b>Route Number:</b> <u>495</u>	<b>* Location:</b> <u>HOLE #1</u> <b>Offset Dist.:</b> _____		
<b>Map Number:</b> _____	<b>* Sta. From:</b> <u>1+00</u> <b>Sta. To:</b> <u>1+00</u>		
<b>County:</b> <u>CUMBERLAND</u>		<b>Coastal Plain:</b> <u>(Y)</u> N (circle one)	
<b>† Producer/Supplier:</b> _____		<b>† Plant ID#:</b> _____	
<b>† Brand Name:</b> _____		<b>Shelf Life Date:</b> _____	
<b>† Date Produced:</b> _____		<b>† Asphalt Mix/ JMF ID:</b> _____	
<b>† Concrete Mix:</b> _____		<input type="checkbox"/> Approved <input type="checkbox"/> Other	
<b>† Alternate IDs Type:</b>	<b>Prefix</b>	<b>Range:</b>	<b>Description of Items:</b>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
Please use reverse side for test data, comments, and additional information. Check here if more on reverse <input type="checkbox"/>			

## APPENDIX D

### Soil Classification Test Report Examples

When reviewing the following report, refer to Appendix A for Acceptance Criteria, refer to Appendix B for the Boring Log, and refer to Appendix C for examples of a completed sample card.

J/m  
M & T Form 503

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAY MATERIALS & TESTS UNIT SOILS LABORATORY

T. I. P. No. \_\_\_\_\_

#### REPORT ON SAMPLES OF BORROW --- Costal Plan Criteria

Project	6.142008T	County	WASHINGTON	Owner	PATRICK
Date: Sampled	10/8/02	Received	10/10/02	Reported	10/14/02
Sampled from	PROPOSED PIT			By	R. M. ROGERS
Submitted by	N. W. WAINAINA			1995 Standard Specifications	

699976 TO 700003  
10/14/02

#### TEST RESULTS

Proj. Sample No.		S-1	S-1A	S-1B	S-1C	S-1D	S-2
Lab. Sample No.		699976	699977	699978	699979	699980	699981
Retained #4 Sieve	%	-	-	-	-	-	-
Passing #10 Sieve	%	100	100	100	100	100	100
Passing #40 Sieve	%	96	97	100	98	82	96
Passing #200 Sieve	%	24	40	13	16	5	11

#### MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60	%	22.8	10.8	10.8	14.0	50.3
Fine Sand Ret - #270	%	56.3	55.1	78.0	72.3	46.1
Silt 0.05 - 0.005 mm	%	12.8	16.0	7.2	7.6	1.6
Clay < 0.005 mm	%	8.0	18.0	4.0	6.0	2.0
Passing #40 Sieve	%	-	-	-	-	-
Passing #200 Sieve	%	-	-	-	-	-

L. L.	14	25	22	19	18	21
P. I.	NP	6	NP	NP	NP	NP
AASHTO Classification	A-2-4(0)	A-4(0)	A-2-4(0)	A-2-4(0)	A-3(0)	A-2-4(0)
Station						
Hole No.						
Depth (Ft)	0.00	2.00	5.00	10.00	18.00	3.00
to	2.00	5.00	10.00	18.00	29.00	7.00
	OK	OK	OK	OK	OK	OK

cc: N. W. WAINAINA  
L. T. PACKER  
Soils File

\_\_\_\_\_  
Soils Engineer



**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAY**  
**MATERIALS & TESTS UNIT**  
**SOILS LABORATORY**

T. I. P. No. \_\_\_\_\_

REPORT ON SAMPLES OF BORROW --- Costal Plan Criteria

Project	6.142008T	County	WASHINGTON	Owner	PATRICK
Date: Sampled	10/8/02	Received	10/10/02	Reported	10/14/02
Sampled from	PROPOSED PIT	By	R. M. ROGERS		
Submitted by	N. W. WAINAINA	1995 Standard Specifications			

699976 TO 700003

10/14/02

## TEST RESULTS

Proj. Sample No.		S-2A	S-2B	S-2C	S-3	S-3A	S-3B
Lab. Sample No.		699982	699983	699984	699985	699986	699987
Retained #4 Sieve	%	-	-	-	-	-	-
Passing #10 Sieve	%	100	100	100	100	100	100
Passing #40 Sieve	%	95	92	76	96	96	99
Passing #200 Sieve	%	5	5	3	22	13	44

## MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	40.4	40.2	62.8	25.5	27.1	6.6
Fine Sand Ret - #270	%	55.3	55.9	34.4	55.3	61.1	54.5
Silt 0.05 - 0.005 mm	%	2.3	1.9	1.8	13.2	3.8	20.8
Clay < 0.005 mm	%	2.0	2.0	1.0	6.0	8.0	18.0
Passing #40 Sieve	%	-	-	-	-	-	-
Passing #200 Sieve	%	-	-	-	-	-	-

L. L.		19	20	16	16	20	23
P. I.		NP	NP	NP	NP	NP	6
AASHTO Classification		A-3(0)	A-3(0)	A-3(0)	A-2-4(0)	A-2-4(0)	A-4(0)
Station							
Hole No.							
Depth (Ft)		7.00	13.00	23.00	0.00	2.00	6.00
	to	13.00	23.00	29.00	2.00	6.00	8.00
		OK	OK	OK	OK	OK	OK

\_\_\_\_\_  
Soils Engineer

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAY**  
**MATERIALS & TESTS UNIT**  
**SOILS LABORATORY**

T. I. P. No. \_\_\_\_\_

REPORT ON SAMPLES OF BORROW --- Costal Plan Criteria

Project 6.142008T County WASHINGTON Owner PATRICK  
 Date: Sampled 10/8/02 Received 10/10/02 Reported 10/14/02  
 Sampled from PROPOSED PIT By R. M. ROGERS  
 Submitted by N. W. WAINAINA 1995 Standard Specifications

699976 TO 700003  
 10/14/02

## TEST RESULTS

Proj. Sample No.		S-3C	S-3D	S-4	S-4A	S-4B	S-4C
Lab. Sample No.		699988	699989	699990	699991	699992	699993
Retained #4 Sieve	%	-	-	-	-	-	-
Passing #10 Sieve	%	100	99	100	100	100	99
Passing #40 Sieve	%	77	58	97	100	99	82
Passing #200 Sieve	%	10	2	39	18	66	6

## MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	50.3	79.4	17.8	2.4	2.8	34.7
Fine Sand Ret - #270	%	41.3	18.8	45.3	84.2	39.7	60.7
Silt 0.05 - 0.005 mm	%	6.4	0.8	18.8	11.4	29.5	3.6
Clay < 0.005 mm	%	2.0	1.0	18.0	2.0	28.1	1.0
Passing #40 Sieve	%	-	-	-	-	-	-
Passing #200 Sieve	%	-	-	-	-	-	-

L. L.	16	18	22	23	33	20
P. I.	NP	NP	6	NP	15	NP
AASHTO Classification	A-3(0)	A-3(0)	A-4(0)	A-2-4(0)	A-6(8)	A-3(0)
Station						
Hole No.						
Depth (Ft)	8.00	23.00	1.00	3.00	10.00	13.00
to	18.00	29.00	3.00	10.00	13.00	23.00
	OK	OK	OK	OK	OK	OK

Soils Engineer

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAY**  
**MATERIALS & TESTS UNIT**  
**SOILS LABORATORY**

T. I. P. No. \_\_\_\_\_

## REPORT ON SAMPLES OF BORROW --- Costal Plan Criteria

Project 6.142008T County WASHINGTON Owner PATRICK  
 Date: Sampled 10/8/02 Received 10/10/02 Reported 10/14/02  
 Sampled from PROPOSED PIT By R. M. ROGERS  
 Submitted by N. W. WAINAINA 1995 Standard Specifications

699976 TO 700003  
 10/14/02

## TEST RESULTS

Proj. Sample No.		S-4D	S-5	S-5A	S-5B	S-5C	S-6
Lab. Sample No.		699994	699995	699996	699997	699998	699999
Retained #4 Sieve	%	-	-	-	-	-	-
Passing #10 Sieve	%	99	100	100	100	100	100
Passing #40 Sieve	%	70	97	100	97	77	97
Passing #200 Sieve	%	3	42	38	14	4	13

## MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	65.9	19.4	4.4	19.6	51.8	33.5
Fine Sand Ret - #270	%	31.3	40.1	66.9	69.3	44.6	54.9
Silt 0.05 - 0.005 mm	%	1.8	22.4	20.6	7.0	2.6	6.6
Clay < 0.005 mm	%	1.0	18.0	8.0	4.0	1.0	5.0
Passing #40 Sieve	%	-	-	-	-	-	-
Passing #200 Sieve	%	-	-	-	-	-	-

L. L.	16	23	20	17	16	18
P. I.	NP	7	NP	NP	NP	NP
AASHTO Classification	A-3(0)	A-4(0)	A-4(0)	A-2-4(0)	A-3(0)	A-2-4(0)
Station						
Hole No.						
Depth (Ft)	23.00	1.00	5.00	13.00	23.00	0.00
to	29.00	3.00	8.00	23.00	29.00	4.00
	OK	OK	OK	OK	OK	OK

Soils Engineer



**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAY**  
**MATERIALS & TESTS UNIT**  
**SOILS LABORATORY**

T. I. P. No. \_\_\_\_\_

REPORT ON SAMPLES OF BORROW --- Costal Plan Criteria

Project 6.142008T County WASHINGTON Owner PATRICK  
 Date: Sampled 10/8/02 Received 10/10/02 Reported 10/14/02  
 Sampled from PROPOSED PIT By R. M. ROGERS  
 Submitted by N. W. WAINAINA 1995 Standard Specifications

699976 TO 700003  
 10/14/02

## TEST RESULTS

Proj. Sample No.		S-6A	S-6B	S-6C	S-6D		
Lab. Sample No.		700000	700001	700002	700003		
Retained #4 Sieve	%	-	-	-	-		
Passing #10 Sieve	%	100	99	98	96		
Passing #40 Sieve	%	98	84	69	63		
Passing #200 Sieve	%	4	9	4	3		

## MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	23.2	42.4	62.1	67.4		
Fine Sand Ret - #270	%	73.6	50.1	35.0	30.0		
Silt 0.05 - 0.005 mm	%	2.1	6.5	1.9	1.6		
Clay < 0.005 mm	%	1.0	1.0	1.0	1.0		
Passing #40 Sieve	%	-	-	-	-		
Passing #200 Sieve	%	-	-	-	-		

L. L.	19	15	16	20		
P. I.	NP	NP	NP	NP		
AASHTO Classification	A-3(0)	A-3(0)	A-3(0)	A-3(0)		
Station						
Hole No.						
Depth (Ft)	4.00	12.00	18.00	23.00		
to	10.00	18.00	23.00	29.00		
	OK	OK	OK	OK		

\_\_\_\_\_  
 Soils Engineer

## APPENDIX E

The following pages contain additional soil report examples from a different project. Note the samples which have restrictions due to the P.I. (noted by \*) exceeding specified criteria. During construction, project personnel must take precautions to ensure the restricted soils within these areas of the borrow pit are not placed in the top two feet of the embankment or backfill sections.

M & T Form 503

### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAY MATERIALS & TESTS UNIT SOILS LABORATORY

T. I. P. No. \_\_\_\_\_

#### REPORT ON SAMPLES OF BORROW --- Statewide Criteria

Project	8.2428603	County	DAVIDSON	Owner	J. C. SMOE
Date: Sampled	2/26/93	Received	3/1/93	Reported	3/8/093
Sampled from	PIT#3	By	GILLIAM&WEAVER		
Submitted by	R. O. BLACK JR.		1990 Standard Specifications		

931061 TO 931074  
10/17/02

#### TEST RESULTS

Proj. Sample No.	1	1A	1B	2	2A	3
Lab. Sample No.	931061	931062	931063	931064	931065	931066
Retained #4 Sieve %	-	-	-	-	-	-
Passing #10 Sieve %	100	100	100	100	100	100
Passing #40 Sieve %	99	100	100	100	100	97
Passing #200 Sieve %	77	83	87	85	94	82

#### MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60 %	18.0	14.0	12.0	21.0	16.0	19.0
Fine Sand Ret - #270 %	18.0	7.0	10.0	17.0	10.0	17.0
Silt 0.05 - 0.005 mm %	43.0	40.0	32.0	27.0	29.0	40.0
Clay < 0.005 mm %	21.0	39.0	46.0	35.0	45.0	24.0
Passing #40 Sieve %	-	-	-	-	-	-
Passing #200 Sieve %	-	-	-	-	-	-

L. L.	49	54	62	55	59	46
P. I.	10	21	28*	16	28*	14
AASHTO Classification	A-5(10)	A-7-5(20)	A-7-5(29)	A-7-5(18)	A-7-5(32)	A-7-5(13)
Station						
Hole No.	1	1	1	2	2	3
Depth (Ft)	0.00	3.00	8.00	0.00	4.00	0.00
to	3.00	8.00	11.00	4.00	9.00	2.00
	OK	OK	--	OK	--	OK

cc: R. O. BLACK  
Soils File

\* Acceptable But Not to be used in the top 2 ft of embankment or backfill.

\_\_\_\_\_  
Soils Engineer

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAY**  
**MATERIALS & TESTS UNIT**  
**SOILS LABORATORY**

T. I. P. No. \_\_\_\_\_

**REPORT ON SAMPLES OF** BORROW --- Statewide Criteria

Project 8.2428603 County DAVIDSON Owner J. C. SMOE  
 Date: Sampled 2/26/93 Received 3/1/93 Reported 3/8/093  
 Sampled from PIT#3 By GILLIAM&WEAVER  
 Submitted by R. O. BLACK JR. 1990 Standard Specifications

931061 TO 931074  
 10/17/02

**TEST RESULTS**

Proj. Sample No.		3A	3B	4	4A	5	5A
Lab. Sample No.		931067	931068	931069	931070	931071	931072
Retained #4 Sieve	%	-	-	-	-	-	-
Passing #10 Sieve	%	100	100	100	100	100	100
Passing #40 Sieve	%	100	100	99	100	89	99
Passing #200 Sieve	%	92	98	81	92	70	87

**MINUS NO. 10 FRACTION**

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	13.0	16.0	36.0	21.0	29.0	19.0
Fine Sand Ret - #270	%	11.0	12.0	13.0	11.0	14.0	8.0
Silt 0.05 - 0.005 mm	%	47.0	29.0	40.0	27.0	38.0	29.0
Clay < 0.005 mm	%	29.0	43.0	21.0	41.0	29.0	44.0
Passing #40 Sieve	%	-	-	-	-	-	-
Passing #200 Sieve	%	-	-	-	-	-	-

L. L.	49	67	64	59	58	67
P. I.	19	30*	18	27*	19	26*
AASHTO Classification	A-7-5(21)	A-7-5(38)	A-7-5(20)	A-7-5(30)	A-7-5(15)	A-7-5(29)
Station						
Hole No.	3	3	4	4	5	5
Depth (Ft)	2.00	7.00	0.00	4.00	0.00	4.00
to	7.00	10.00	4.00	10.00	4.00	9.00
	OK	--	OK	--	OK	--

\_\_\_\_\_  
 Soils Engineer

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAY  
MATERIALS & TESTS UNIT  
SOILS LABORATORY**

T. I. P. No. \_\_\_\_\_

**REPORT ON SAMPLES OF BORROW --- Statewide Criteria**

Project 8.2428603 County DAVIDSON Owner J. C. SMOE  
 Date: Sampled 2/26/93 Received 3/1/93 Reported 3/8/093  
 Sampled from PIT#3 By GILLIAM&WEAVER  
 Submitted by R. O. BLACK JR. 1990 Standard Specifications

931061 TO 931074

10/17/02

**TEST RESULTS**

Proj. Sample No.		6	6A				
Lab. Sample No.		931073	931074				
Retained #4 Sieve	%	-	-				
Passing #10 Sieve	%	100	100				
Passing #40 Sieve	%	98	100				
Passing #200 Sieve	%	90	94				

**MINUS NO. 10 FRACTION**

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	23.0	17.0				
Fine Sand Ret - #270	%	16.0	6.0				
Silt 0.05 - 0.005 mm	%	27.0	28.0				
Clay < 0.005 mm	%	34.0	49.0				
Passing #40 Sieve	%	-	-				
Passing #200 Sieve	%	-	-				

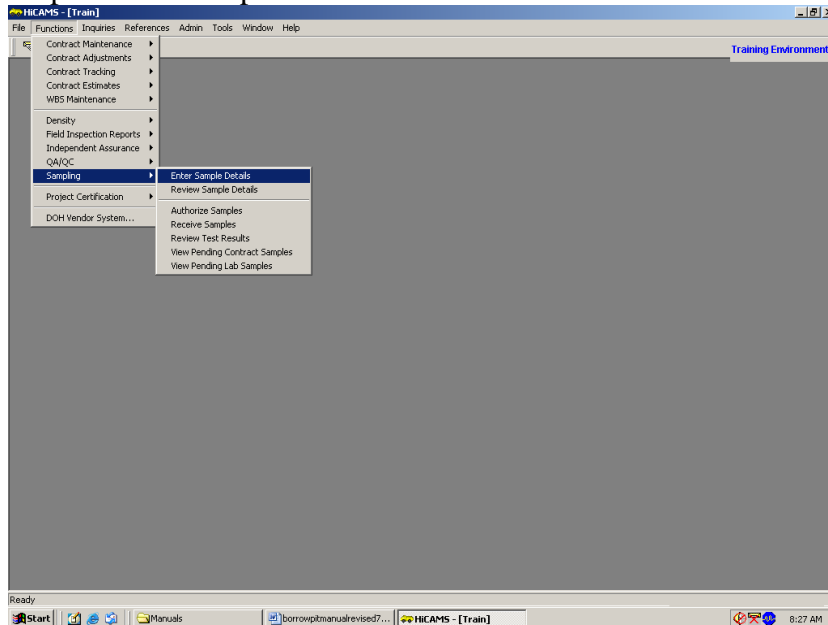
L. L.	55	66					
P. I.	12	24					
AASHTO Classification	A-7-5(17)	A-7-5(31)					
Station							
Hole No.	6	6					
Depth (Ft)	0.00	3.00					
to	3.00	11.00					
	OK	OK					

\_\_\_\_\_  
Soils Engineer

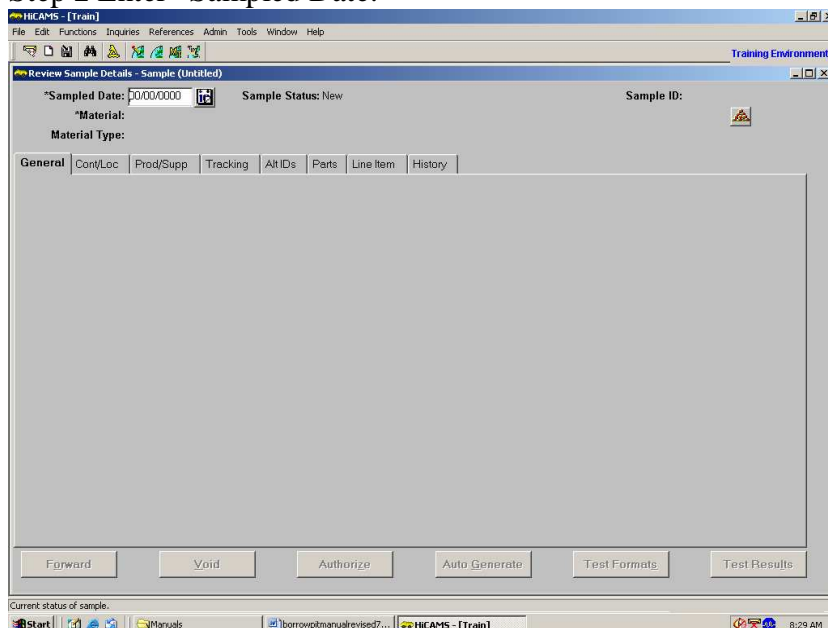
## APPENDIX F

This appendix summarizes the steps for entering borrow pit soil samples into HiCAMS. If the Technician sampling a proposed borrow pit does not have an active Borrow Pit Sampling Certification the sample will not count towards the minimum sampling frequency as required by the Minimum Sampling Guide. Any samples obtained by a Technician without a valid certification will be used for information only. For this example, the sample was obtained for a construction project in the Cumberland County area.

### Step 1 Select Sample Details window



### Step 2 Enter "Sampled Date:"



Step 3 Enter information prompted by the next screen.

Review Sample Details - Sample (Untitled)

Sampled Date: 12/03/2009 Sample Status: New Sample ID:

Material Selection

Filter: ☐ Material Type ☒ Contract

Material Type Group: (All) Contract: (All)

Material Type: (All) Line Item: (All)

Material: (All) Unit of Measure: (All)

Metric/English: (All) From Date: 08/03/2009 To: 08/03/2009

Retrieve Reset

Material	UOM	Line Item	Contract Mod	Work Item	Material Type	CBOM MSG From Date	CBOM MSG To Date	Gro
----------	-----	-----------	--------------	-----------	---------------	--------------------	------------------	-----

OK Cancel

Step 4 After information has been entered select “Retrieve” and then select “OK”

Review Sample Details - Sample (Untitled)

Sampled Date: 12/03/2009 Sample Status: New Sample ID:

Material Selection

Filter: ☐ Material Type ☒ Contract

Material Type Group: Soils Contract: C201977

Material Type: Earthwork Excavations - Borrow Line Item: BORROW EXCAVATION

Material: Unit of Measure: (All)

Metric/English: (All) From Date: 08/03/2009 To: 08/03/2009

Retrieve Reset

Material	UOM	Line Item	Contract Mod	Work Item	Material Type	CBOM MSG From Date	CBOM MSG To Date	Gro
Borrow Excavation	Cubic Meters	12			Earthwork Excavations - Borrow	05/19/2009	12/31/2075	Soils

OK Cancel

## Step 5 Enter sample information within the “General” tab

**HICAMS - [Train]**  
File Edit Functions Inquiries References Admin Tools Window Help

Training Environment

**Review Sample Details - Sample (Untitled)**

\*Sampled Date: 08/03/2009 Sample Status: New Sample ID:

\*Material: Borrow Excavation

Material Type: Earthwork Excavations - Borrow (v2.01)

**General** Cont/Loc Prod/Supp Tracking Alt IDs Parts Line Item History

\*Sample Owner: +Contract: C201977 Field ID:

\*Testing Category: WBS: 35196.3.ST1

☐ Check Sample PO / Other ID:

+Related Sample ID: Auth Lab: Soils Lab

+IA Correlat. Field ID: > ABC Test: Sample Freq: UOM: Cubic Meters

# of Pieces: \*Represented Qty: .000 Avail Qty: .000

QC Sample ID:

To be used in:

Comment:

**Sample Frequency Comments:** Density: 1 per 3800 cubic Meters for Acceptance. IA Comparative is 1 per 88000 cubic Meters. QUALITY: Sampled per Borrow Pit Sampling Guide, Sample size is 5 lb bag, per hectare.

**Disposition**

Accepted Qty: .000 Pay Adjusted Qty: .000

Removed Qty: .000 Checked by Sample:

Forward Void Authorize Auto Generate Test Formats Test Results

Ready

Start Manuals borrowpitmanualrevised7... HICAMS - [Train] 8:38 AM

## Step 6

**HICAMS - [Train]**  
File Edit Functions Inquiries References Admin Tools Window Help

Training Environment

**Review Sample Details - Sample (Untitled)**

\*Sampled Date: 08/03/2009 Sample Status: New Sample ID:

\*Material: Borrow Excavation

Material Type: Earthwork Excavations - Borrow (v2.01)

**General** Cont/Loc Prod/Supp Tracking Alt IDs Parts Line Item History

\*Sample Owner: Project +Contract: C201977 Field ID: S-1

\*Testing Category: Source Approval/Evaluation WBS: 35196.3.ST1

☐ Check Sample PO / Other ID:

+Related Sample ID: Auth Lab: Soils Lab

+IA Correlat. Field ID: > ABC Test: Sample Freq: 1.000 UOM: Cubic Meters

# of Pieces: 1 \*Represented Qty: 1.000 Avail Qty: 1.000

QC Sample ID:

To be used in: Embankment and/or subgrade

Comment:

**Sample Frequency Comments:** Density: 1 per 3800 cubic Meters for Acceptance. IA Comparative is 1 per 88000 cubic Meters. QUALITY: Sampled per Borrow Pit Sampling Guide, Sample size is 5 lb bag, per hectare.

**Disposition**

Accepted Qty: .000 Pay Adjusted Qty: .000

Removed Qty: .000 Checked by Sample:

Forward Void Authorize Auto Generate Test Formats Test Results

Ready

Start borrowpitmanualrevised7... HICAMS - [Train] 7:41 AM

## Step 7 Select the “Cont/Loc” tab and enter sample information

HICAMS - [Train]

File Edit Functions Inquiries References Admin Tools Window Help

Training Environment

Review Sample Details - Sample (Untitled)

\*Sample Date: 06/03/2009 Sample Status: New Sample ID:

\*Material: Borrow Excavation

Material Type: Earthwork Excavations - Borrow (v2.01)

General Cont/Loc Prod/Supp Tracking Alt IDs Parts Line Item History

RE: Wise, PE, Randy Office Phone: (910) 488-1070

\*Sample From: (None) \*Other:

Structure Number: 00000 Route Description:

Route Type: Route Number: Map Number:

\*Location: Offset Distance: \*Station From: + \*Station To: +

County: (None) ☐ Coastal Plain

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Location sample was taken.

Start Manuals [borrowpitmanualrevised7...] HICAMS - [Train] 8:43 AM

Step 8 Note: this project has more than one borrow pit as indicated in the “Location” entry window. The approximate depth from which the soil sample was obtained is also listed in the “Location” window. If station(s) are provided, enter into “Station” windows. “Coastal Plain” is checked due to Cumberland County falling within the coastal plain criteria requirements. Refer to Section 1018 Borrow Material in the **NCDOT Standard Specifications for Roads and Structure** to determine if the proposed borrow pit meets statewide or coastal plain criteria.

HICAMS - [Train]

File Edit Functions Inquiries References Admin Tools Window Help

Training Environment

Review Sample Details - Sample (Untitled)

\*Sample Date: 06/03/2009 Sample Status: New Sample ID:

\*Material: Borrow Excavation

Material Type: Earthwork Excavations - Borrow (v2.01)

General Cont/Loc Prod/Supp Tracking Alt IDs Parts Line Item History

RE: Wise, PE, Randy Office Phone: (910) 488-1070

\*Sample From: Borrow Pit \*Other:

Structure Number: 00000 Route Description: Fayetteville Loop

Route Type: I Route Number: 495 Map Number:

\*Location: Bore Hole 1 (Depth 0 - 0.5 m) / Pit 1

Offset Distance: \*Station From: 1 + 00 \*Station To: 1 + 00

County: Cumberland ☒ Coastal Plain

Forward Void Authorize Auto Generate Test Formats Test Results

Ready

Start [HICAMS - [Train]] [borrowpitmanualrevised7...] 1:54 PM



## Step 9 Select the “Tracking” tab and enter sample information

**HICAMS - [Train]**

File Edit Functions Inquiries References Admin Tools Window Help

Training Environment

**Review Sample Details - Sample (Untitled)**

\*Sampled Date: 08/03/2009 Sample Status: New Sample ID:

\*Material: Borrow Excavation

Material Type: Earthwork Excavations - Borrow (v2.01)

General Cont/Loc Prod/Supp **Tracking** Alt IDs Parts Line Item History

Current Facility:

\*Sampled Date: 08/03/2009 \*Sampled By: Certification Override Comment:

\*Submitted Date: 00/00/0000 \*Submitted To: (None)

Part ID	Sent	To	Received	At
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Forward Void Authorize Auto Generate Test Formats Test Results

Ready

Start Manuals borrowpitmanualrevised7... HICAMS - [Train] 9:02 AM

## Step 10 Enter sample information and select the save button. Record the “Sample ID” in the top right box of the sample card (labeled “HICAMS #:”).

**HICAMS - [Train] - [Review Sample Details - Sample (Untitled)]**

File Edit Functions Inquiries References Admin Tools Window Help

Training Environment

\*Sampled Date: 08/03/2009 Sample Status: In Transit Sample ID:

\*Material: Borrow Excavation

Material Type: Earthwork Excavations - Borrow (v2.01)

General Cont/Loc Prod/Supp **Tracking** Alt IDs Parts Line Item History

Current Facility:

\*Sampled Date: 08/03/2009 \*Sampled By: Flowers, James V Certification Override Comment:

\*Submitted Date: 08/04/2009 \*Submitted To: Fayetteville Regional Lab

Sampled By: Flowers, James V - Directly supervised by Resident Engineer and Technical Trainer of Soils Laboratory

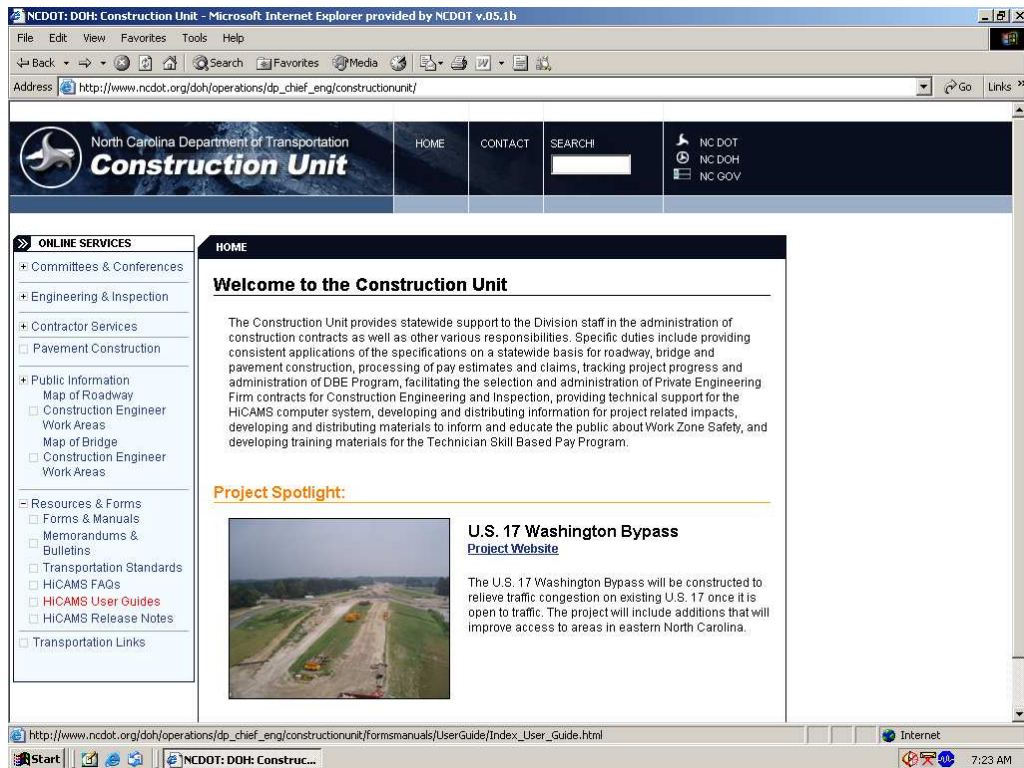
Part ID	Sent	To	Received	At
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Forward Void Authorize Auto Generate Test Formats Test Results

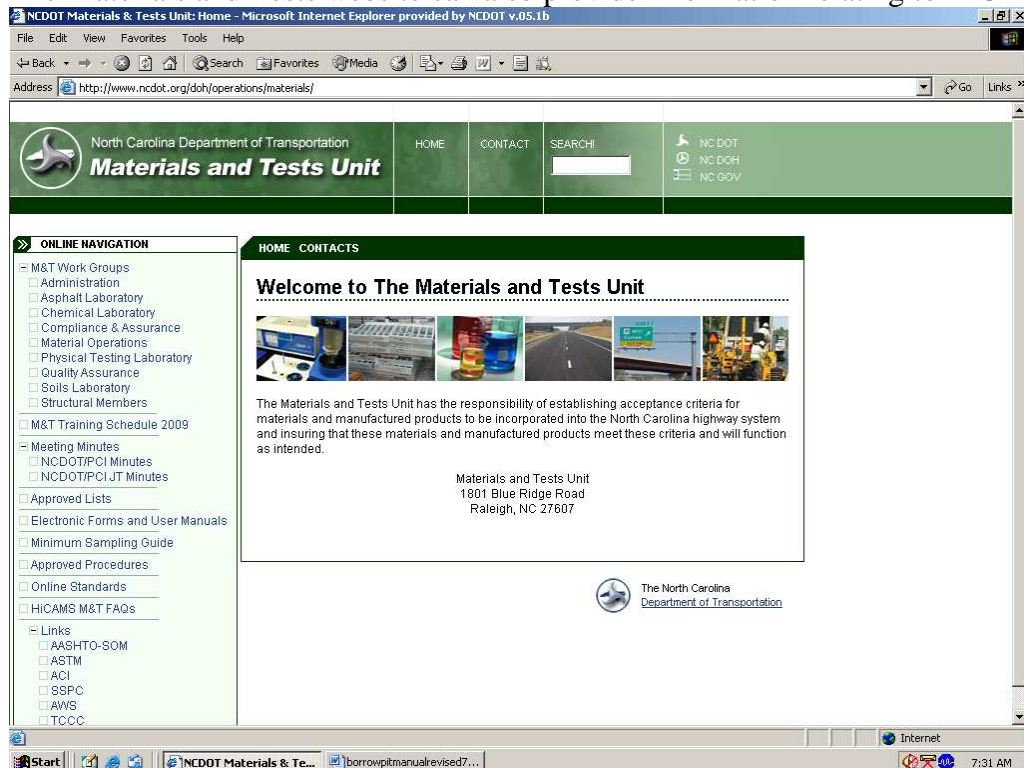
Ready

Start Manuals borrowpitmanualrevis... HICAMS - [Train] - ... DOH Vendor System - ... 9:10 AM

Since the HiCAMS database is changed periodically, personnel responsible for entering data into the system should monitor the Construction Unit's website for updates. The information can be found under the "Resources & Forms" Section.



The Materials and Tests website can also provide information relating to HiCAMS.



## **GLOSSARY**

**Atterburg Limits** – Four states of soil consistency as defined by the liquid limit, plastic limit and shrinkage limit tests.

**Capillary Action (Capillarity)** – The rise or movement of water in the interstices of a soil due to capillary forces

**Capillary Water** – Water subject to the influence of capillary action

**Cohesion** – All of the shear strength of a soil not due to friction; the capacity of sticking or adhering together

**Consolidation** – The gradual reduction in volume of a soil mass resulting from an increase in compressive stress

**Elasticity** – Ability of a soil to return to its original shape after having been deformed by a load for a short period of time

**Equigranular** – A soil that is made up of predominately one grain size

**Friable** – Easily crumbled, as would be the case with rock that is poorly cemented

**Liquid Limit** – The water content, as determined by the standard liquid limit test, at which a soil passes from a plastic to a liquid state.

**Optimum Moisture Content** – The moisture content at which a soil can be compacted to its maximum dry density with a given compactive effort.

**Plasticity** – The property of a soil that allows it to be deformed beyond the point of recovery without cracking or appreciable volume change.

**Plastic Index** – The numerical difference between the liquid limit and the plastic limit.

**Plastic Limit** – The lowest water content, as determined by the standard plastic limit test, at which a soil remains plastic.

**Shrinkage and Swell** – Volume change due to build-up and release of capillary tensile stresses within the soil's pore water.

**Soil** – Any earthen material, excluding bed rock, composed of loosely bound mineral grains of various sized and shapes, organic material, water, and gases.

**Soil Binder** – The finer sized particles in a soil that serve the purpose of holding the soil together.

**Soil Horizon** – One of the layers of the soil profile, distinguished principally by its various layers, as developed by deposition or weathering or both.

**Soil Profile** – Vertical section of a soil, showing the nature and sequence of the various layers, as developed by deposition or weathering or both.

**Soil Texture (Grain Size Distribution or Gradation)** – Proportion of a material of each grain size present in a given soil.

**Water Content (Moisture Content)** – The ratio, expressed as a percentage, of the weight of water in a given soil mass to the weight of solid particles